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Abstract:

Aim: A comprehensive overview of numerous studies and research endeavours focusing on the Nasal Index across diverse geographical regions aims to discern the prevailing nasal types in these areas. These investigations delve into diverse populations, investigating the Nasal Index's variations and assoc ia ted nasal morphologies within these specific regions.
Objective of the review: Exploring the potential clinical significance of the Nasal Index within the realm of Forensic Science aims to establish its practical relevance and applications in this field of study.
Type of Review: Analysing and summarizing multiple studies systematically.
Background: The Nasal Index, a crucial anthropometric measurement, relies on factors like Nasal height and Nasal w idth. I t serves as a valuable tool in differentiating racial and sexual characteristics. Additionally, it aids in the identification of unknown individuals. The shape and dimensions of the nose a re influenced by environmental factors and various climatic conditions.
Result: The study outcomes indicate a strong correlation between the Nasal Index and climatic conditions. L onger, narrower noses tend to be prevalent in cold and dry regions, while broader noses are more commonly observed in warmer climates.
Keywords- Nasal Index, Anthropometric Measurement, Forensic Science, Climatic Conditions, Racial and Sexual Characteristics

INTRODUC TION

Facial Anthropometry
Facial anthropometry stands out as a vital tool within the domain of forensic science and reconstructive surgery. It facilitates the determination of an individual's racial origin, often centred on nasal morphology. Within facial anthropometry, nasal anthropometry specifically examines the shape and size of the nose in humans. This field h olds significance in forensic science and physical anthropology, serving as a powerful method to identify distinctions among races, ethnicities, and genders (Singh et al.(2017),(Yadav et al. (2019)
Nasal Index
The nasal index, a prominent anthropometric measurement, has historical roots tracing back to early explorations and classifications of human physical diversity. Conceived in the 19th century, the nasal index is a ratio that juxtaposes the w idth of the nose to its height, shedding light on nasal shape and its potential correlation w ith geographical or igins and racial classifications. Regrettably, during the era of scientific racism, the nasal index was wie lded as a tool for classifying and categorizing human populations into racial groups, founded on the erroneous belief that nasal morphology could indicate racial superiority or inferiority. However, as scientific knowledge advanced and our comprehension of human variation deepened, these unfounded not ions were unequivocally debunked (Leong et al. (2009),(Hegazy et al. (2014) The nasal index is but one of the diverse skeletal measurements that forensic anthropologists may employ in this endeavour. By scrutinizing the width and height of the nasal aperture and calculating the nasal index, forensic anthropologists can glean discernible patterns in nasal morphology. W hen this information is synthesized with other skeletal features and anthropometric measurements, it can yield invaluable insights into the probable ancestral background of the individual. Different ancestral groups typically exhibit distinctive nasal shapes and sizes owing to a combination of genetic factors and generations of adaptation to specific environments.
The historical significance of the nasal index resides not only in its role in the evolution of anthropological theories but also in its transformation from an instrument of racial categorization into a marker exemplifying the intricate interplay between genetics, environment, and human adaptation. Presently, the nasal index assumes a specialized role as a potential marker for a iding in the estimation of an individual's ancestral background. When human remains, particularly skeleta l remains, are unearthed, ascertaining the individual's ancestry can be of paramount importance in narrowing down potential matches in missing persons cases or offering contextual insights in forensic investigations (D hulqar nain et al. (2020)
Numerous studies underscore the influence of bioenvironmental factors, geographical location, biological factors, ethnicity, sex, and age, especially concerning head and neck dimensions. The nose, as an integral component of facial anatomy, assumes paramount importance. Classification based on nasal parameters encompasses nasal height, w idth, and length. These classifications include leptorrhine (long and narrow nose), mesorrhine (medium-sized nose), and platyrrhine (broad nose), each characterized by distinct nasal index ranges, contribute to the understanding of human diversity (Tahmasebi et al.(2015)
The external nose's shape varies significantly among individuals, a characteristic influenced by race, ethnicity, age, sex, and culture. These variations are of significant utility in investigative contexts, enhancing our understanding of human populations and their physical distinctions (Zaidi et al. (2017)
Furthermore, forensic anthropology is a multifaceted discipline that bridges anthropology and forensic science, contributing essential insights to legal and medico-legal investigations. The nasal index, despite its controversial historical usage, has evolved into a valuable tool for estimating ancestral backgrounds in forensic anthropology (Hegazy et al. (2014) Anthropometry, with its historical roots and enduring utility, remains indispensable in understanding human physical diversity. Within the realm of forensic science, facial anthropometry, including nasal anthropometry, assumes a pivotal role in racial determination and forensic investigations. These tools collectively underscore the complex interplay of genetics, environment, and adaptation in the study of human diversity and aid in the pursuit of justice and truth.

Figure 1Factors affecting the nasal shape and size

Global A nthropometric Studies on Nasal Morphology: Insights from 2006 to 2021:
The nasal index is defined as the proportion of nasal breadth in relation to nasal length. (Omotoso et al, (2019).
Omotoso, D. (2019). Anthropometric evaluation of nasal height, nasal breadth and nasal index among Bini children in Southern N igeria.
It varies greatly among different population and in different climatic conditions. In case of any mass disaster where fragmented and mutilated body were found in that case nasal index data might be used by the experts to identify its race, sex, and nose types of an unknow n individual whose identity is unknown. There are five types of nose (Martin and Sallar, 1957).

1. HyperLe ptorrhine: Refers to a very long and narrow nose.
2. Leptorrhine: Refers to a long and narrow nose.
3. Mesorrhine: Refers to a medium-sized nose.
4. Platyrrhine: Refers to a broad nose.
5. Hyperplatyrrhine: Refers to a very broad nose.

Many studies were conducted to estimate the race of an individual for example, Oladipo et al. (2006) conducted a study focusing on the Igbo, Yoruba, and Ijaw ethnic groups. They measured nasal height (NH) and nasal breadth (N B) in 750 subjects each from the Igbo and Yoruba groups, along with 175 subjects from the Ijaw ethnic group. Subsequently, the y computed the nasal indices based on these measurements. The findings indicated that, on average, the mean nasal index was 94.1±0. 37 for the Igbos, 89.2±0.30 for the Yorubas, and 96.37±1.06 for the Ijaws. T hese results revealed that all three ethnic groups exhibited a platyrrhine nose type.Then another study was done by Oladipo et al. in 2009, conducted a study focusing on the Andoni and Okrika tribes in the River State of the Nigeria Delta region. They examined 400 individuals aged between 21 to 30 years, using sliding calipers to take measureme nts. The mean nasal index for the Andonis wa s 79.83±4.19 for males and 83.77±1.09 for females. Conversely, for the Okrikas, the mean nasal index was 86.23±1.72 for males and 86.46±2.37 for females. The study revealed that males exhibited significantly higher nasal indices compared to females. A dditionally, the Okrikas displayed a platyrrhine nose type, while the Andonis exhibited a mesorrhine nose type. Then, In 2010, G.S. Oladipo conducted a study involving the Ekpeye and Ikwerre ethnic groups in Nigeria. This research included 500 subjects, with an equal split of 250 males and 250 females randomly chosen from each ethnic group, aged between 18 to 32 years. All measurements were conducted using a sliding caliper. The findings revealed that Ekpeye males and females exhibited mean nasal indices of 93.72±0.57 and 88.99±0.61, respective ly. On the other hand, Ikwerre males and females displayed mean nasal indices of 84.81±0.57 and 93.17±0.51, respectively. These values displayed significant differences between the two groups. Ekpeye males, Ekpeye females, and Ikwerre females had nasal indices above 85, classifying them under the platyrrhine category. However, Ikwerre males fell within the mesorrhine nose type category with a nasal index ranging between 70.00 and 84.9.Another study was cducted in 2012, by Staka the study on the Kosovo Albanian population aimed at aiding in the racial classification of unknown individuals. The study involved 204 subjects, comprising 101 males and 103 females, all w ithin the age range of 18 to 25 years.

In 2013, Anas et a l. conducted a study comparing the nasal index between the Hausa and Yoruba ethnic groups in Nigeria. The research encompassed 582 subjects, consisting of 385 Hausa individuals and 197 Yoruba individuals. U sing a sliding vernier caliper, measurements were taken, and Minitab 16 w as employed for data analysis. The findings revealed that the mean nasal index for Hausa males was 70.7 ±11.3, higher than that of Hausa females, which was 67.2±8.3. Similarly, the mean nasal index for Yoruba males was 100.9±8.9, exceeding that of Y oruba females, which was 94.1±8. These results indicate differing nasal indices between the Hausa and Yoruba ethnic groups, suggesting distinct nose types for each group.

In 2014, Paul et al. conducted a study aimed at providing anthropometric data on nasal parameters among three major ethnic groups (Okun, Igala, and Ebira) in Kogi State, Nigeria. The research involved 302 subjects aged between 17 to 45 years, comprising 109 Okun individuals (57 males, 52 females), 107 Igala individuals (55 males, 52 females), and 86 Ebira individuals (55 males, 31 females). Nasal height and w idth were measured using a sliding vernier caliper, enabling the calculation of the nasal index. Statistical analyses inc luded independent t-tests and ANOVA. The findings indicated that the mean nasal index for Okun males and females were 97.23±7.89 and 93.64±8.22, respectively; for Igala males and females, the mean nasal index was 97.21±8.88 and 93.48±8.72; and for Ebira males and females, it was 96.93±8.66 and 92.99±7.62, respectively. Additionally, sexual differences in nasal parameters were observed within each ethnic group. These ethnic groups—Okun, Igala, and Ebira—were identified as falling under the platyrrhine nose type category.

In 2015, Shah et al. conducted a study focused on adult male Santhals and Bengalis in Bangladesh. Their objective was to document nasal measurements—nasal length, width, and nasal index—among these groups, enabling comparisons between them and potentially with other ethnicities. The Santhals, re siding in the northwest region of Bangladesh, were the subjects of this study due to their distinct ethnic identity and recognizable physical characteristics. The research, descriptive and observational in nature, occurred at the Department of Anatomy, Rangpur Medical College, between July 2011 and June 2012. They included 100 adult male Santhals and 100 adult male Benga lis from various locations in Rangpur and Dinajpur districts. Nasal length and width were measured using a sliding caliper, and the nasal index was calculated. Statistical analysis involved an unpaired t-test to compare measurements. The findings revealed that Bengalis had a significantly greater mean nose length compared to Sa nthals, while Santhals had a significantly greater mean nose width than Bengalis. Predominantly, Santhals displayed a mesorrhine nose type, while Bengalis tended towards a leptorrhine classification.

In 2017, Mehta et al. conducted a study on the Indian nose, involving 1000 volunteers evenly distr ibuted across five distinct geographic groups: Nor th, Central, West, South, and the H imalayan region. The aim was to assess nasal morphology variations within the Indian population across different regions. Photographic analysis was used for measurements. The mean nasal height and width for the study p opulation were found to be 50.48 mm and 36.59 mm, respectively. Nasal profiles differed significantly a mong the five regions. North Indians exhibited the longest nose (52.69 mm nasal height) but the narrowest (35.01 mm width), indicating a leptorrhine nose with characteristics akin to Caucasoids. South Indians displayed the w idest nose (nasal width = 38.66 mm), while individuals from the Himalayan region had the shortest noses (nasal height = 47.2 mm). On average, Indians tended toward a mesorrhine nose, distinguishing it from Caucasians w ith leptorrhine noses, Orientals, and their platyrrhine counterparts from African populations. T his study highlighted substantial facial architecture differences among individuals from diverse regions w ithin the country, e mphasizing the distinctiveness of the Indian nose compared to Caucasian, Oriental, and African populations.

In 2019, Tanko et al. conducted a study on the Nupe ethnic group within the Katcha Local Government Area of Niger state. Their research involved 400 students from colleges and secondary schools aged between 12 to 20 years. The findings indicated a significant difference in nasal index between males and females, with males show ing notably higher indices. Additionally, the study revealed that a platyrrhine nose type was prevalent within this population.

In 2019, Kpela et al. conducted a study focusing on the adult T iv and Idoma tribes in Nigeria. They examined a sample of 600 youths aged 18 to 32 years, utilizing a sliding caliper for measurements, followed by statistical analysis of the gathered data. The findings revealed distinct sexual differences in nasal length, breadth, and nasal index w ithin both ethnic groups, with males consistently disp laying significantly higher mean values than females. Consequently, the assessment based on nasal index led to the conclusion that both ethnic groups exhibited a platyrrhine nose type.

In 2019, Dhulqar nain et al. conducted a comparative study analyzing nasal characteristics between the northwestern Nigerian and Iranian populations. T hey measured nasal breadths and heights from 400 individuals, w ith 200 participants belonging to the Hausa ethnic group in northwestern Nigeria and 200 participants from Northern Tehran, Iran. The study involved calculating and statistically analyzing the nasal index (NI). Significant differences in the NI between sexes were observed in both populations. For the Iranian population, nasal shapes were identified as 127 leptorrhine (31.9%), 62 mesorrhine (15.6%), and nine pla tyrrhine (2.3%). In contrast, the Nigerian Hausa population predominantly exhibited a mesorrhine nose shape with 120 instances (30.2%), followed by 75 leptorrhine (18.8%) and five platyrrhine (1.3%) instances. These findings indicated a prevalence of mesorrhine nose shapes among the Nigerian Hausa population and leptorrhine among Northern Iranians. Additionally, the NI of males was noted to be higher than females in both populations.

Estimation of Sex and Nose types through Nasal Index
Identifying person on basis of its gender (males and females) and its nose types. Several studies were conducted on males and females of different populations and regions. For example In 2008, Oladipo et al. conducted a study on the Yorubas in N igeria, involving 1000 participants aged between 18 to 45 years, equally divided into 500 males and 500 females. T he collected data underwent statistical analysis, revealing a higher nasal index a mong males compared to females. Furthermore, the findings indicated that a major ity of individuals from the Yoruba ethnic group were classified under the nose type known as platyrrhines.
In 2009, Oladipo et al. conducted a study aiming to compare nasal indices between the Ekpeye and Ikwerre ethnic groups in Rivers State, Nigeria. They selected 500 individuals from each group—250 males and 250 females—ensuring pure ethnic lineage from both parents and grandparents. The subjects' ages ranged from 18 to 32 years. Using a sliding caliper, nasal height (NH) and breadth (N B) were measured, allowing for the calculation of nasal index (NI) as NB/NH×100. Statistical analysis employed the z-test. Results showed that Ekpeye males and females displayed mean nasal indices of 93.72±0.57 and 88.99±0.61, respectively, while Ikwe rre males and females had mean nasal indices of 84.81±0.57 and 93.17±0.51. The overall mean nasal index for Ekpeyes was 93.36±0.59 and for Ikwerres, 88.99±0.54. Specifically, Ekpeye males, E kpeye females, and Ikwerre females had nasal indices above 85, c la ssifying them as platyrrhine, whereas Ikwerre males fell within the mesorrhine nose type with an index ranging between 70.00 and 84.9. These findings underscored distinct variations in nasal types between the two ethnic groups.
In 2011, Omotoso et al. conducted a study on the Adult Bini Tribe in Nigeria, which involved 450 Bini subjects aged between 16 to 35 years, with an equal split of 230 males and 230 females. The findings indicated significant differences in facial and nasal dimensions between sexes. Specifically, males e xhibited a higher nasal index compared to females, indicating a platyrrhine nose type among males.Similarly, in the same year, Aniboe et al. conducted a study on males and females of Isoko descent. The research encompassed 210 males and 200 females aged between 18 to 35 years. Utilizing a sliding caliper, measurements were taken and statistically analyz ed using descriptive statistics and t-tests. The results revealed that males had a higher nasal index compared to females, showing a difference in nasal characteristics between the genders.
In 2012, Gangrade conducted a study on the adult tribal population of Southern Rajasthan, involving 500 males and 500 females aged between 18 to 50 years. Measurements were taken using a sliding vernier caliper, and all data underwent thorough statistical analysis. T he study revealed that males exhibited a slightly higher nasal index than females and presented a mesorrhine nasal for m. In the sa me year
In 2012, Choudhary et al. conducted a study on tw o ethnic groups in Rajasthan, involving 200 natives: 100 Jats and 100 Sindhis aged between 19 to 25 years. Using a sliding caliper, measurements were taken for nasal height and breadth. Statistical analysis of the collected data revealed that the mean nasal height for Jats was 56.42±3.70, while for Sindhis, it was 55.8±4.61. Additionally, nasal breadth for Jats measured at 38.42±2.86 and for Sindhis at 39.24±3.38. T hese findings suggested that Jats were characterized by a Leptorrhine nose type, whereas Sindhis exhibited a Mesorrhine nose type.
In 2013, Esomonu conducted a study on adults belonging to the Bekwara ethnic group in Cross River State, Nigeria. The research observed sexual dimorphism, highlighting elevated measurements in males. Both males and females exhibited a platyrrhine nose type, with males de monstrating a higher nasal index compared to females.
In 2014, Li K. et al. conducted a study on Han Chinese young adults, involving 900 subjects comprising 501 females and 399 males. Measurements of the soft tissues of the external nose were taken, encompassing 12 linear distance items and 5 angles, leading to the determination of six proportion indices. The study revealed significant differences between females and males in various nasal measurements. Females exhibited notably smaller dimensions in nasal base width, nasal ala length, nasal alae thickness, columella height, columella width, and nasal tip w idth (all, P < 0.01). Additionally, in angular measurements, females displayed a smaller nasal tip angle and nasolabial angle (both, P < 0.05), while show ing a larger nostr il tilt angle, nasofrontal ang le, and nasal tip angle (all, P < 0.001). Some ratios, such as nasal depth-nasal width and columella height-nasal depth, were significantly less in males c ompared to females, whereas nasal alae length-nasal height was notably less in females compared to males. In the sa me year, Hegazy conducted a study on the Egyptian population, involving 290 subjects aged between 1 month to 65 years. The study revealed sexual dimorphism in nasal anthropology emerging after the age of 20 years. Also in 2014, Ogah et al aimed to determine the nasal index in a specific population, comparing it between sexes and w ith pr ior studies. Their research involved 893 volunteers aged 18 to 35 years, comprising 428 males and 465 females. Analysis of data collected through standard anthropometr ic methods indicated a male to female ratio of 1:1.1, with similar mean ages and BMI between the genders. The majority in the study were Yoruba (82.3%), with the rest being a minority. The study highlighted a platyrrhine nose type prevailing at 59.6%, with higher nasal indices observed in males compared to females.

In 2015, Asharani conducted a study on tertiary medical care institute students in Southern India, focusing on those aged between 18 to 23 years. Using sliding calipers, measurements were taken, revealing that the majority of the Indian population, both in South India and North India, exhibited a mesorrhine nasal form. In the same year, Tahmasebi et al. conducted research on 200 medical students from Tehran University in Iran, evenly divided between 100 males and 100 females aged 18 to 30 years. Measurements of nasal height and width using a sliding vernier caliper indicated that males had a significantly higher nasal index compared to females. The study also identified the nasal form of Iranian individuals as leptorrhine. In 2015, Esomonu et al. aimed to establish standard values for nasal anthropometric parameters among the Efik ethnic group in Cross River State, Nigeria. The study involved 600 subjects—300 males and 300 females—aged 6 to 20 years. Results revealed sexual dimorphism in the 11-15 years age group, with higher nasal height and nasal length observed in females. The overall mean nasal index for males was 90.36±9.4 and for females was 89.76±11, suggesting a Platyrrhine nose type among the Efik ethnic group.Similarly, Ekwere et al. studied the Berom ethnic group in Plateau State, Nigeria, with 500 participants—250 males and 250 females—ranging from 18 to 45 years old. Utilizing sliding calipers, measurements were taken, indicating that males had a higher nasa l index than females.Ano ther study conducted in 2015 by Zolbin et al. focused on determining the nasal anthropometric characteristics of residents in Qazvin, Iran. The research included 300 adults aged 18 to 55 years, compr ising 160 males and 140 females. Measurements of nasal parameters revealed that males had a highe r nasal index compared to females. The prevalent nasal variability observed was type A (Platyrrhine nose) in 70.5% of cases, with Type B (mesorrhine) occurring in 26.7% of cases, predominantly among fe males, and Type C (leptorrhine) being less common at 2.8%.

In 2016, Ray et al. conduc ted a study involving 300 students (150 males and 150 females) aged 18-30 years from the Western Uttar Pradesh region. Using a sliding caliper, they measured nasal parameters and statically analyzed the data. The mean nasal index of 73.98±1.9 indicated that males had a higher nasal index than females, presenting a mesorrhine nose type. In the same year, Packiriswamy et al. aimed to compare nasal anthropometric measurements of South Indian women (SIW) with N orth American white women (NAWW). They analysed standardized photographs of 375 SIW aged 18 to 35 ye ars. Comparative analysis revealed significant differences in 15 of 17 me asurements and all 14 calculated nasal indices. SIW exhibited relatively shorter, wider, horizontally oriented noses, ellipsoid appearance in submental view, deeper nasal root, under-rotated nasal tip, flared alae, and rounded nasal tip c ompared to NAWW. Additionally, in 2016, Ukoha et al. conducted a study on a student population of 500 subjects—250 males and 250 females aged between 18 to 25 years. Using a Mitutoyo manual vernier caliper, they measured nasal parameters and calculated nasal indices. The mean nasal index for males was 89.95±11.26 and for females was 85.71±10.76. The study revealed sexual dimorphism, with significantly higher values in all parameters among males compared to females, categorizing the subjects under the platyrrhine nose type.

In 2018, Mohammed et al. conducted a study on Northern Nigerian individuals to establish baseline data for nasal indices and classify nose types. They examined 200 subjects, measuring nasal height and w idth using a sliding caliper and calculated nasal indices. Their findings showed significant differences in nasal width, height, and index between sexes, categorizing nasal shapes into 120 mesorrhine (60%), 75 leptorrhine (37.5%), and platyrrhine (2.55%). Males exhibited higher nasal indices than females. Similarly, in 2018, Ravichandran et al. focused on South Indian people of various age groups to evaluate facial and nasal indice s and their correlation w ith gender. They analyzed nasal and facial measurements in 41 males and 39 females, calculating nasal and facial indices. The study highlighted that males had greater nasal and facial indices than females among the South Indian population. Then, A delak un et al., also in 2018, studied the Oyemekun ethnic group in Akure, Southwest Nigeria, compr ising 125 males and 125 females aged 18-65 years. Using a sliding caliper, they measured nasal parameters and calculated nasal indices. Males exhibited significantly higher mean nasal indices compared to females. The Oye mekun ethnic group was categorized as having a mean nasal index within the platyrrhine nose type. Similarly, Sadhvi et al. (2018) conducted a gender determination study among South Indian populations, evaluating nasal indices in 41 males and 39 females of various age groups. Measurements of nasal width and height were taken with a Vernier caliper, revealing slightly higher nasal indices in South Indian males compared to females. Moreover, Ballin et al. (2018) investigated the Caucasian nose in Curitiba, Brazil, involving 100 Caucasian volunteers at a Southern Brazilian hospital. They obtained measurements through photographs and analysed various nasal parameters, noting differences between genders in nasofrontal angle and nasal tip projection compared to aesthetic ideals.

In 2019, various studies delved into diverse populations, shedding light on nasal characteristics. A sthuta et al. focused on Bali Aga populations in Tenganan, analysing 20 samples aged 17-30 years, revealing the Platyrrhine nose type. They suggested that the Nasal Index could aid in determining personal identity, such as race, ethnicity, and gender differences. Kulkarni et al. examined 159 healthy volunteers in Medical College Baroda, Gujarat, aged 18-25 years, observing significant nasal index differences between males and females. The most common nasal type was Mesorrhine. Similarly, Jaberi et al., in Shiraz University of Medical Science, evaluated 200 subjects aged 18-30 years, noting a prevalence of platyrrhine nose type among them. Omotoso et al. studied 500 Bini children (250 males and 250 females) aged 5-12 years, revealing higher nasal indices in males and identifying the platyrrhine nose type in both male and female Bini children. Shrestha et al. conducted a study on 140 dental students in Nepal, discovering that the Mesorrhine nose type was predominant among the population. Males exhibited a mean nasal index of 84.49±12.46mm, and females had 80.66±15.32mm.Jabeen et al. investigated different zones of Jammu and Kashmir using 120 first professional MBBS students aged 18 to 22 years, demonstrating sexual dimorphism in nasal parameters. They found variations in nasal index across dif ferent zones, with the most common nasal form being leptorrhine or moderately narrow nose. Bajracharya et al. studied dental college students aged 17 to 25 years in Nepal, comprising 160 students with equal male-female representation. Their findings indicated a Mesorrhine type of nose based on a mean nasal index of 78.03±7.07. While nasal width and height showed significant differences, the nasal indices between male and female students were not significantly different. Hill Janajati exhibited the highest nasal index, followed by Newar, Brahmin, Chettri, and O thers.

In 2020, Sinan .S. Far han et al. conducted a study on Iraqi Arabic and Kurdish populations involving 311 subjects aged 19-23 years. Subjects were categorized by gender, race (Arabic or Kurdish), and residence regions in Iraq (north, middle, and south). U sing a digital Vernier caliper, various nose parameters were measured. Significant differences were observed in nose height and length between Arabs and Kurds, with nasal indices recorded as 60 for Arabic individuals and 60.6 for Kurds. Sexual dimorphism was notable across all measured parameters, and fine nose type was the most common among the subjects. Another study in 2020 by Chongtham aimed to determine nasal indices of fetuses within the Manipuri population. The study involved 64 Manipuri fetuses ranging from 12 to 40 weeks of gestation. Nasal height and width were measured using a vernier caliper, and statistical analyses were performed. The findings revealed a statistically significant correlation between gestational age and both nasal height and breadth. At full term, the nasal index of a Manipuri fetus was identif ied as platyrrhine.
In 2022, Gulzar et al., conducted the study and its main aim was to identify sexual and ethnic differences in external nose measurements among young adult Kashmir is, A group of 300 healt hy participants from the Kashmiri community was involved, evenly split into 150 males and 150 females. Nasal height, length, and breadth were measured using a vernier caliper, and the nasal index was calculated for each individual. Rigorous statistical analysis was applied to the collected data. Distinct measurements were revealed between genders. In males, the mean nasal index was measured at 83.31±12.31 mm, with a me an nasal length of 57.28±4.51 mm, mean nasal breadth recorded at 48.41 mm, and mean nasal height at 36.17±20.9 mm. Conversely, females displayed different measurements: a mean nasal index of 226.83±46.41 mm, mean nasal length of 50.16±3.54 mm, mean nasal height of 13.97±2.01 mm, and mean nasal breadth of 31.02 mm. Among the Kashmiri male population, the prevalent nasal type tended towards mesorrhine, while among females, it leaned towards hyperplatyrrine or a notably w ide nose.

In 2023, Nazire et al, conducted the study to avail the standard nose measurements, and variations across different ages and genders were assessed through nose anthropometric assessments on 874 healthy individuals aged 5 to 64, utilizing a caliper. Eight distinct age groups from 5-7 to 41-64 years old were established, and various nasal dimensions were meticulously measured, including length, height, morphological and anatomical width, root width, depth, nostril widths, face width, and face heights. Additio nally, calculations were made for external nasal surface area, volume, nasal index, nasofacial index, and nose -face width index. Classification of adult nose types was based on criteria established by Martin and Sallar, with Mesorrhine identified as the most prevalent nose type through statistical analyses conducted using the SPSS 20.0 Program. Gender differences were observed in most measurements, excluding nasal depth, and significant distinctions were noted across all age groups in length and height me asurements, morphological and anatomical nasal w idth, external nasal surface areas, nasal volume, and various indices. Their applications are expected to extend to areas such as determining age and gender in forensic medicine, aiding anthropology reconstruction studies. Similarly, Vishal et al, did the study in the same year focused on the nasal index (NI), nostril, and philtrum shapes, acknow ledged parameters susceptible to regional, ethnic, and climatic influences. Conduc ted as a cross-sectional investigation, it involved 210 undergraduate students from a medical university from central of Uttar Pradesh. U sing a D igital Vernier Caliper, measurements of nasal height and breadth were taken in centimeters, f acilitating the calcula tion of NI. Nose classification relied on specific NI ranges: leptorrhine (<70), mesorrhine (70–84.9), and platyrrhine (>84.9). A dditionally, the study observed various nostril shapes (rectangular, triangular, teardrop, round) and philtrum shapes (triangular, parallel, flat, concave).The outcomes showcased a mean NI of 76.06 ± 8.614, spanning from 54.7 to 110, predominantly reflecting the mesorrhine variety. Notably, rectangular nostril shapes were prevalent, while triangular philtrum shapes emerged as the most frequent observation. These nasal anthropometric assessments present a direct, dependable, and cost-effective means to scrutinize facial features within a population. These measurements offer pivotal insights and guidelines, potentially relevant in diverse applications like forensic investigations and procedures for facial reconstruction.

DISCU SSION

The extensive body of research presented here revolves around the fascinating field of nasal anthropology, a branch of anthropology that examines the variations in nasal shape and size among different populations, ethnic groups, genders, and age groups. T hese studies employ anthropometric measurements to gain insights into the intricate interplay between genetics, environment, a nd human adaptation, and they have several implications, including forensic science, medical practices, and our understanding of human diversity. Forensic anthropology is prominently featured in these studies, showcasing its importance in identifying human remains, especially in cases of mass disasters, crimes, and human rights violations. The nasal index, as an anthropometric measurement, plays a sign ificant role in estimating an individual's ancestral background. I t can serve as a valuable tool for narrowing down potential matc hes in missing persons cases and providing context in forensic investigations. O ne notable aspect is the historical context of the nasal index, which was once misused for racial categorization but has now evolved into a marker for understanding human variation. The transformation of this measurement from a tool of discrimination to one that aids in forensic and medical contexts underscores the progress in our scientific know ledge and ethical standards. These studies also highlight the immense diversity in nasal anthropometrics within and between various populations, including diffe rent ethnic groups in N igeria, distinct regions in India, Saudi Arabia, Iran, Malaysia, the United States, and more. The presence of sexual dimorphism, where males of ten exhibit different nasal measurements than females, is another note worthy aspect.

Overall, this body of research underscores the importance of studying nasal anthropometrics as a means to appreciate the unique characteristics of diverse populations and to apply this knowledge in practical fields like forensic science and medicine. It sh owcases how anthropometry continues to be a valuable tool for understanding human physical diversity and aiding in various applications across different cultures and regions.

Conclusion

The multitude of studies conducted on nasal anthropometry across various populations and regions consistently reveal distinct differences in nasal characteristics between males and females. These studies encompassed diverse ethnic groups from different parts of the world, providing valuable insights into the variations in nasal morphology based on gender and ethnicity. Across the N igerian ethnic groups studied, including the Igbo, Yoruba, Ijaw, Andoni, Okrika, E kpeye, Ikwerre, Hausa, Okun, Igala, Ebira, Nupe, Tiv, and Idoma, distinct patterns e merged regarding nasal indices and nose types. While some groups predominantly exhibited platyrrhine nose types, characterized by wider nasal indices, others displayed mesorrhine or leptorrhine classifications, indicating variations in nasal w idth and height. Moreover, sexual dimorphism in nasal measurements was consistently observed, with males generally displa ying larger nasal indices compared to females within the sa me ethnic group. This suggests potential hormonal or developmental influences contributing to sexual differences in nasal morphology. Comparative studies between different populations, such as those between Nigerians and Iranians, further highlight the role of genetic and environmental factors in shaping nasal characteristics. The prevalence of mesorrhine nose shapes among Nigerian populations contrasts with the leptorrhine predominance among N orthern Iranians, illustrating regional variations in nasal morphology. T he findings from these studies have impor tant implications for various fields, including anthropology, forensic science, and medical research. They contribute to our understanding of human diversity and provide valuable data for facial reconstruction, age estimation, and gender determination in forensic investiga tions. Additionally, they underscore the importance of considering both genetic and environmental factors when interpreting nasal morphology and its implications for racial and gender identification. Overall, these studies highlight the complexity of nasal variation across populations and underscore the need for further research to elucidate the underlying factors shaping nasal morphology in diverse human populations.

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